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| EXAMINER |
|---|
| HUFFMAN, JULIAN D |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2853 | |

DATE MAILED: 09/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/834,093 | CRIVELLI ET AL. | |
| | Examiner | Art Unit | |
| | Julian D. Huffman | 2853 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *31 May 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

**1.** The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

**2.** Claims 1-9 and 14-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishinaga et al. in view of Kawanabe et al. and Winzer et al.

Ishinaga et al. disclose a printing system receiving input data for printing images on a print media comprising:

an inkjet printhead having a body (fig. 17, element 110) and a large array of ink ejection devices (fig. 1a, region 3) located on a monolithic substrate (fig. 1a/fig. 17 element 102), each being associated with one of plural die sectors (column 6, line 67-column 7, line 2, there are 2 die sectors on each printhead, on each head the temperature of a first die sector is detected by sensor 2 on left side of head, and the temperature of a second die sector is detected by sensor 2 on right side of head, each sensor detecting temperatures at points shown in figs. 11a-11c);

a temperature sensor (fig. 31, elements S1 and S2) that senses temperatures of the plural die sectors and other portions of the inkjet printhead (element 2, figs. 11a-11c show the locations detected by each sensor, one sensor detecting those locations on

one side of the printhead and another sensor detecting those locations on the other side of the printhead, column 10, lines 7-13);

a nozzle member coupled to the substrate (fig. 17, element 103);

a controller (fig. 3, element 11) that uses the sensed temperatures to control temperature variations of the die sectors and at other portions of the printhead to be within a predefined range from a starting point of a print swath to an end point of the print swath and successive print swaths of ink (column 25, lines 45-47, fig. 11a, the temperature at point C, another portion, is influenced by the temperature of the heater at point A, on the die sector);

wherein all of the die sectors are kept at an optimal temperature, including die sectors that are inactive during the print swath (column 25, lines 45-47, temperature of the entire substrate is controlled during printing);

wherein the controller is one of an integrated circuit processor, a printer driver or firmware (column 26, lines 50-59) and further wherein the controller controls an increase in the mean temperature of the substrate through a feedback loop that turns on and off heating elements (H1, H2, column 25, lines 1-15) to control the temperature of the substrate, wherein the controller initiates heating elements associated with the ink ejection elements if the temperature data is below a printing threshold and turns off the heating elements when the threshold temperature of the substrate has been reached;

further comprising a programmable feedback loop that activates heating elements associated with the ink ejection elements and increases the baseline temperature of the substrate before printing and decreases the temperature differential

between the baseline temperature and the mean temperature of the substrate (fig. 39, column 28, line 57-column 29, line 68); and

wherein the controller controls temperatures of specific sections of the substrate and a baseline temperature of ink ejection nozzles of the nozzle member associated with the respective sections (column 25, lines 1-15); and

wherein the controller receives temperature data from a digital temperature sensor (column 24, lines 43-47 and column 8, lines 59-61), compares the temperature data with a set point for printing, and initiates heating elements associated with the ink ejection elements if the temperature data is below a printing threshold.

The limitation that air bubble growth rates and bubble size are minimized within the printhead to enable expulsion of the ink from the printhead without clogging is an intended use limitation and does not define any additional structure of the apparatus, therefore it is given no patentable weight.

Ishinaga et al. do not expressly disclose the use of pigment ink, or optimizing the temperature operating range based on the input data. Also, Ishinaga et al. do not expressly disclose providing the temperature control means on the printhead.

Kawanabe et al. disclose printing with pigment ink (column 85, lines 35-44).

Winzer et al. suggests providing a control means (fig. 1, element 28) in close proximity to the device it controls (column 5, lines 53-58).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute pigmented ink in the invention of Ishinaga et al. and to provide the temperature control means on the printhead. The reason for performing the

modification would have been to maintain superior contrast over dye ink, between a black printed region and a differently-colored region such as white paper, as taught by Kawanabe et al. and reducing the signal to noise ratio, as taught by Winzer et al.

**3.** Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ishinaga et al. in view of Kawanabe et al. and Winzer et al. as applied to claim 8 above, and further in view of Kato et al. (U.S. 6,135,656).

Ishinaga et al., as modified by Kawanabe et al. and Winzer et al., do not expressly disclose heating black pigment ink to 40 degrees Celsius and color pigmented ink to 45 degrees Celsius.

However, Kato et al. disclose that ink should be temperature adjusted in a range of 30-70 degrees Celsius (column 18, lines 22-25).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to control the temperature of the ink in a range of 30-70 degrees Celsius. The reason for performing the modification would have been to maintain the viscosity of the ink at a value that provides reliable ejection of ink.

**4.** Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishinaga et al. in view of Kawanabe et al. and Barteck (U.S. 4,403,229).

Ishinaga et al. disclose a method for printing images with an inkjet printhead on a print media from a printing system having heating elements located on a substrate, the method comprising:

receiving temperature values of plural die sectors having a set of ink ejection elements of the substrate before printing begins (column 28, line 57-column 29, line 1);

comparing the temperature values with set points for printing for each die sector (column 29, lines 48-53);

initiating the heating elements associated with the die sectors that have temperatures below a predetermined printing threshold (column 29, line 50-column 30, line 5);

turning off the heating elements associated with the die sectors that have temperatures below a predetermined printing threshold when the threshold temperature of the substrate has been reached (column 30, lines 1-5); and

controlling temperature variations of the die sectors of the printhead to be within a predefined range from a starting point of a print swath to an end point of the print swath and successive print swaths of ink (column 25, lines 45-47);

wherein all of the die sectors are kept at an optimal temperature, including die sectors that are inactive during the print swath (column 25, lines 45-47 and column 30, lines 7-14, the entire substrate is temperature controlled during printing);

maintaining a mean temperature of the substrate at a temperature that is within a predefined range of an optimal temperature for the production of a droplet of ink (column 28, lines 10-13); and

controlling temperatures of specific sections of the substrate and a baseline temperature of ink ejection nozzles associated with the respective sections (column 25, lines 1-15).

Ishinaga et al. do not expressly disclose the use of pigment ink. Also, Ishinaga et al. do not expressly disclose minimizing air bubble growth rates and bubble sizes within the printhead to enable expulsion of ink from the printhead without clogging.

Kawanabe et al. disclose printing with pigment ink (column 85, lines 34-44).

Barteck teaches that air may enter the head through thermal cycling, or temperature fluctuations (column 2, lines 53-61).

Barteck et al. support that the invention of Ishinaga et al. would perform the air bubble minimization, since it would substantially reduce temperature changes, and also provides motivation for using the invention of Ishinaga et al. to perform such a function.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to substitute pigmented ink in the invention of Ishinaga et al. and to use the invention of Ishinaga et al. to minimize air bubble growth rates and bubble sizes within the printhead. The reason for doing such would have been to maintain superior contrast over dye ink, between a black printed region and a differently-colored region such as white paper, as taught by Kawanabe et al., and to prevent air from degrading performance of the head since temperature fluctuations cause air to enter the head and degrade performance of the head (column 2, lines 41-42), as taught by Barteck et al.

### *Response to Arguments*

**5.** Applicant's argument that the prior art does not teach controlling temperature of all of the die sectors, including die sectors that are inactive during printing, has been considered and is respectfully not deemed persuasive. Ishinaga et al. control the

temperature of the entire substrate to maintain temperature uniformity, and do such during printing, regardless of which nozzles are firing at any given time. Additionally, the temperature keeping heaters effect the temperature of a large section of ink ejectors, some of which would be printing and some of which would not be printing at any given time during a print job.

Applicant's additional arguments are not persuasive for the reasons outlined in the rejection above.

***Conclusion***

**6.** Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

**7.** Any inquiry concerning this communication or earlier communications from the examiner should be directed to Julian D. Huffman whose telephone number is (703) 308-6556. The examiner can generally be reached Monday through Friday from 9:00 a.m. to 5:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier, can be reached at (703) 308-4896. The fax phone number for the organization where this application or proceeding is assigned is (703) 308-7722. Faxes requiring the immediate attention of the examiner may be sent directly to the examiner at (703) 746-4386. Note that this number will not automatically send a confirmation that the fax was received.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JH

September 17, 2003

Stephen D. Meier
Primary Examiner